The Formation of the Emergency Medical Services System

The evolution of the emergency medical services system in the United States accelerated rapidly between 1960 and 1973 as a result of a number of medical, historical, and social forces. Current emergency medical services researchers, policy advocates, and administrators must acknowledge these forces and their limitations and work to modify the system into one that provides uniformly high-quality acute care to all patients, improves the overall public health through injury control and disease prevention programs, participates as a full partner in disease surveillance, and is prepared to address new community needs of all types. (Am J Public Health. 2006;96:414–423. doi:10.2105/AJPH.2004.048793)

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THE EVOLUTION OF THE emergency medical services (EMS) system has been a slow process. Although modern EMS initially developed during Napoleon's time to aid injured soldiers,[1] few major changes occurred in EMS until the 1960s. Between 1960 and 1973, a number of medical, historical, and social forces converged, leading to the development of a more structured EMS system in the United States. These forces have had a tremendous impact on the structure and functioning of the EMS system, resulting in profound public health implications today.

Modern EMS is considered to have started with Jean Dominique Larrey, Napoleon's chief physician, who organized a system to treat and transport injured French soldiers.[1] During the Civil War, the Union Army developed an organized system to evacuate soldiers from the field.[2] Lessons learned during the Civil War were applied as civilian EMS systems formed during the late 1800s. By 1960, a patchwork of unregulated systems had developed, with services sometimes being provided by hospitals, fire departments, volunteer groups, or undertakers. Physicians staffed some ambulances, while others had minimally trained or untrained personnel.[2] Despite the major expansion in health care facilities and the emphasis on medical specialization after World War II, the EMS system had not received much attention or innovation.[3,4]

DEVELOPMENT OF HEALTH CARE

In 1960, treating heart disease and cancer were of such interest that the need for a government-sponsored program to cure them appeared in the 1960 Democratic Party platform.[5] Following the common belief in post–World War II United States that funding for scientific and technological advances would lead to improvements in health,[4] President Kennedy empanelled a commission chaired by Michael DeBakey to improve the care of patients with heart disease and cancer. The report was to have been presented on April 17, 1961, but it was "lost" in the furor surrounding the Bay of Pigs invasion and never

presented to President Kennedy.[6] However, these clinical conditions continued to receive significant attention, and the treatment of heart disease and cancer, as well as trauma and stroke, would later become central to the argument for improving the EMS system.

A major reason for the deep interest in cancer, heart disease, stroke, and trauma was the perception that they formed the majority of the public health burden. President Lyndon Johnson announced in his Health Message in 1964 that "two thirds of Americans now living will . . . suffer or die from [heart disease, cancer, or strokes]."[7] Three other factors were also involved. First, treatment of cardiovascular disease and cancer had significant public interest and support because Mary Lasker and other social and medical activists had fought to expand research on these diseases.[4,6] Second, trauma was identified as a public health "crisis." In 1960, President Kennedy announced that traffic accidents in the United States were a major public health problem needing attention.[8] By 1965, Congressional leaders noted the large and rapidly increasing health and financial cost of trauma.[9] This "crisis" was occurring despite advances in trauma care that had reduced the mortality rate for injured soldiers reaching medical facilities from 4.5% during World War II to less than 2% during Vietnam.[10]

In 1964, President Johnson asked DeBakey and others to develop a program to conquer heart disease, cancer, and stroke.[11] President Johnson stated: " . . . we are interested in the food stamp plan . . . Medicare . . . the Civil Rights Bill . . . Poverty Bill . . . [but] there is no other [program] that really offers more and greater hope. . . . "[7(p88)] The resulting report developed a plan to attack these diseases and to improve the national capabilities for scientific advancement and for providing medical services. Among the 35 conclusions was a recommendation that the government assist in establishing regional associations centered around academic medical centers to improve research, education, and patient care. Another recommendation was that the government work to ensure the proper dissemination of medical advances, and to translate research advances to benefit the health of the population.[7,12] These recommendations, reminiscent of the final report of the Committee on the Costs of Medical Care,[13] resulted in the Regional Medical Programs (RMP).[14–17]

Five RMP characteristics were important. First, although RMPs were created for heart disease, cancer, and stroke, national RMP leaders felt that they had to provide a "much wider range of services, and [they] did that."[18] Second, RMP funding was through grants and not through categorical federal programs. This funding mode allowed the creation of regional programs on the basis of regional needs without committing the federal government to developing programs or providing long-term funding for the programs.[19] Third, RMPs moved control of health care improvements from the local to the regional level, with the regional associations forming independently based upon common needs. Thus, the regions varied, some including multiple states or counties and often extended across traditional jurisdictional boundaries, but the regions did not cover the entire nation.[11] RMP supporters hoped that this revolutionary concept of a regional health care system would lead to a reorganization of all US health services and result in improved patient care.[20,21] Fourth, RMPs promoted expansion of health care providers by expanding training for groups such as nurse practitioners, physician assistants, and emergency medical technicians.[22] Finally, RMPs promoted a philosophy of technologically advanced and intensive health care, centered on academic medical centers.[6,23] RMP supporters hoped that the programs—including development of coronary care and neonatal intensive care units, teaching current medical personnel new skills, and expanding health care services—would bring advances in medical knowledge directly to the patient.[22]

"RMP funding helped create a number of EMS systems and train emergency medical technicians. Without the RMPs, it is unlikely that sufficient funds would have been available in an organized manner to advance EMS."

RMPs had a tremendous impact upon the development of EMS. RMP funding helped create a number of EMS systems and train emergency medical technicians.[1,22,24,25] Without the RMPs, it is unlikely that sufficient funds would have been available in an organized manner to advance EMS. More importantly, EMS was shaped by the philosophy underlying the RMPs. The primacy of heart disease, cancer, and stroke within the RMPs was impressed upon EMS, resulting in a system

designed to combat these conditions. The concept of regionalized health care became commonly accepted in EMS. For example, taking trauma or burn patients to specialty centers became expected of EMS providers.[26] Finally, the delivery of technologically advanced intensive care to patients located throughout a region, a core role of EMS, reflected the philosophy of RMPs. Although the RMPs were later disbanded by President Nixon, their legacy for EMS is significant.

INITIAL EMS DEVELOPMENTS

Despite the lack of uniform federal legislation, regulations, or standards, and despite the absence of legislation, regulations, and standards in most states and cities, EMS was developing and providing care to patients. Most advances had occurred through interest by local physicians, hospitals, firefighters, government officials, or entrepreneurs. The result was a disorganized system of variable and sometimes poor quality care. In 1960, only 6 states had standard courses for rescuers, only 4 states regulated ambulance design specifications, and fewer than half of all EMS personnel had received even minimal training (e.g., American Red Cross first aid).[27] A survey of 900 cities in 1965 found that only 23% regulated EMS service, and only 8% reported advanced EMS medical training, such as the American Red Cross advanced first aid course.[28]

"Despite the lack of uniform federal legislation, regulations, or standards, and despite the absence of legislation, regulations, and standards in most states and cities, EMS was developing and providing care to patients."

During 1965 and 1966, a convergence of political and medical actions focused the national interest on motor vehicle crashes. In 1965, President Johnson, continuing Kennedy's interest in motor vehicle crashes, created the President's Commission on Highway Safety. The Commission's report identified the great public health burden of motor vehicle crashes and stated that a coordinated national highway safety program should be a major priority.[29] In particular, the Commission felt that the timeliness and adequacy of care of the injured patient were critical. President Johnson announced his intention to discuss highway safety in his State of the Union address and transportation message in 1966.[9,30]

Simultaneously, a report released in 1966 by the National Academy of Sciences–National Research Council was extremely critical of the emergency care system. This comprehensive report, titled "Accidental Death and Disability: The Neglected Disease of Modern Society,"[31] documented the absence of quality emergency care. Some EMS-related inadequacies included: (1) no treatment protocols; (2) few trained medical personnel; (3) inefficient transportation; (4) lack of modern communications and equipment; (5) the abdication of responsibility by political authorities; and (6) the lack of research evaluating prehospital care.[31] The recommendations of both reports were incorporated into the Highway Safety Act of 1966.[9]

The law established the cabinet-level Department of Transportation to accelerate highway traffic safety programs and improve EMS. The Act specifically provided for federal involvement to improve EMS plans, ambulance specifications, equipment standards, communications, educational requirements, staffing, and other aspects of caring for medical emergencies. Additionally, the Act allowed for penalties in the event of states' failure to follow the provisions regarding EMS.[9,32]

The legislation reflected some of the prevalent themes of the 1960s, which had also been seen in the RMPs. First, the Department of Transportation was to accomplish its EMS goals primarily through a combination of demonstration projects and matching grants. This allowed different regions to experiment with different types of EMS systems. It also made it unnecessary to create categorical federal programs that would expand the federal government and require continual funding. Second, the EMS system being developed was to be technologically advanced, with significant attention to using new technology, such as radio communication and telemetry, that would allow EMS to operate over large regions. Technologically intensive medical equipment, promoted by medical leaders, would soon follow. Finally, the EMS system was supposed to improve the transportation of patients to specialty medical centers, providing advanced care to all patients in a region and supporting the regionalization of health care encouraged by the RMPs.

The assignment of EMS responsibility to the Department of Transportation, as opposed to the Department of Health, Education, and Welfare, reflected the

view that EMS was primarily a transportation service and not a medical service. For example, during the Highway Safety Act deliberations, the need for EMS was framed as a need to "concentrate on improvement in methods of communication and transportation as well as the need for improved equipment and trained personnel."[9(p2755)] Medical equipment and staff were secondary to communications and transport. Additionally, in the 1969 Highway Safety Program manual from the Department of Transportation, the only emergency care described was first aid as taught in the American Red Cross program "First Aid on the Highways,"[33] despite the existence of more advanced prehospital treatments.

Although the government viewed EMS as a transportation service, medical and community leaders had begun to alter their view of the EMS system. Medical advances of the 1960s, combined with innovative EMS programs to deploy advanced medical technologies throughout the community, convinced people that the EMS system could provide medical services. Additionally, the return of military-trained medics from Vietnam, with both prehospital training and experience, provided a cadre of individuals able to apply the skills they had mastered to civilian EMS systems.

ADVANCES IN EMERGENCY MEDICAL CARE

The 1960s were a time of rapid improvement in emergency care. During that decade, the importance of cardiopulmonary resuscitation, defibrillation, cardioversion, and new pharmaceutical therapies was demonstrated.[1] The American Heart Association and the American Red Cross accepted these techniques and began to train health care providers, although EMS providers were initially excluded. Advances in trauma care also occurred, including the development of specialty trauma centers, such as the University of Maryland's Shock Trauma Center. Techniques that had reduced the mortality of injured soldiers reaching medical facilities began to be applied to civilian trauma patients.[10] As a result, physicians and politicians began to treat traumatic deaths as an abnormality, not an inevitable event.[25] In fact, R. Adams Cowley, a leader in trauma and critical care, estimated that a quality emergency health system could cut the accident death rate by 50%.[25]

Many of these newest technologies were being applied by EMS with immediate, quantifiable benefits. Of particular note was the development of the mobile cardiac care unit by Pantridge in Ireland.[34] The initial results of this program showed that, of 10 cardiac arrest patients, all had ventricular fibrillation, all were resuscitated, and 5 were discharged home. These outcomes had never been achieved previously (and have never been achieved since).[34] Similar models were created in the United States. In Columbus, Ohio, a physician-based "Heartmobile" was created. In 1968, the Seattle Fire Department received a grant from the Washington/Alaska RMP to develop a mobile coronary care unit, "Medic 1." Despite the lack of a standardized national curriculum, this program trained "paramedics" to intubate, place intravenous lines, and identify cardiac rhythms. It showed that paramedics could treat cardiac arrest and the importance of getting a health care provider to the patient as quickly as possible, usually within minutes. These successful programs reinforced the need for a technologically advanced EMS system that could provide care within minutes.

EMS AND PUBLIC HEALTH DEVELOPMENT

During the 1960s, public health once again began to receive significant interest. There had been interest in improving public health during the 1930s and 1940s, as shown by comments in the Committee on the Costs of Medical Care report,[13] the development of the New Deal programs, the passage of the Social Security Act of 1935, and wartime health measures.[35] However, that interest had waned during the 1950s, when health department budgets were reduced and individuals advocating public health services ran the risk of being attacked as a "Communist."[35,36] During the late 1950s, 1960s, and early 1970s, the confluence of conditions, including social activism and actions by leaders such as William Haddon, Jr; Ralph Nader; Robert Kennedy; and Daniel Patrick Moynihan, led to the increase in public health interest, legislation, and funding.[37] This new interest followed a more medical model, in many ways paralleling infection control.[38] Rather than the traditional behavioral intervention model, public health interventions for injury control began to include identifying causative agents, mitigating the agents and the activity of the agents, and improving emergency, definitive, and rehabilitative care.[39] The attitude was also reflected in comments made by George E. Pickett, MD, member

of the Executive Board of the American Public Health Association during Senate testimony. Pickett stated that "the health professional has a growing major role in the development of research, education, environmental modification, and emergency care to prevent and ameliorate injury, disability, and economic loss from accidents."[40(p693)]

Proposed and promoted improvements in EMS followed this belief, as reflected in the media. The lay press reported these advances and reported many individual cases of patients being brought back to life.[1] The television show "Emergency" (1971) showed EMS personnel from the Los Angeles County Fire Department heroically responding to patients suffering from traumatic and medical injuries. The EMS staff used newly developed concepts and devices such as cardiopulmonary resuscitation, defibrillation, and intravenous medications.[41,42]

The tension between the state of the federal and local governments' limited development of EMS as a transport service and (1) the transformation of EMS into a medical service using the latest available advances; (2) the media portrayal of EMS medical care and its benefit; and (3) the failure of the federal government to use the enforcement powers in the Highway Safety Act to ensure that states meet the standards for EMS led to additional controversy and demands for legislation during the early 1970s.[25,43]

FURTHER EMS DEVELOPMENT

Although the federal government continued to view EMS as it had in the early 1960s—as a transportation agency that provided basic first aid—medical advances had revolutionized EMS. In 1972 the National Academy of Sciences–National Research Council released an analysis of the EMS system showing that the federal government, despite a stated EMS commitment, lacked a coherent policy and had failed to sufficiently advance EMS.[43]

Despite the report, the Nixon Administration's commitment to EMS continued to be disorganized and contradictory. In 1972, President Nixon stated: "By using new technologies to improve emergency care . . . we can save the lives of many. . . ."[44] Additionally, the Department of Health, Education, and Welfare funded EMS demonstration programs in 5 regions in 1972. However, by 1973, the Division of Emergency Health Services and the RMPs were being eliminated. Congressional leaders worked to correct this lack of political leadership and the division of EMS responsibilities among multiple agencies. In 1972, bills were introduced to "authorize assistance for planning, development and initial operation, research, and training projects for systems for the effective provision of health care services under emergency conditions."[45] Nixon opposed these bills, and none passed.

The Robert Wood Johnson Foundation, noting the importance of EMS,[46] announced in 1973 that it would fund 44 demonstration projects at a total cost of $15 million to have "a catalytic effect on bringing together various aspects of emergency health services."[47] The goals of the program were to develop technology, training, and interagency coordination. The program also actively recognized and supported the need for regionalization of EMS health care by encouraging cooperation between organizations that usually did not cooperate with each other. The codirector of trauma surgery at Yale University, Blair Sadler, was chosen to lead this initiative.[48]

In January 1973, Senators Cranston, Kennedy, and others reintroduced EMS legislation. Supporting arguments for the EMS Systems Development Act were made as they had been in the past. Political leaders described the crisis in public health. Senator Kennedy stated: "Nowhere is the health care crisis . . . more evident . . . than in the appalling lack of high quality emergency medical services."[25] The medical conditions used to argue for the RMP and for the Highway Safety Act of 1966 were highlighted again. It was believed that 350 000 deaths from heart disease and thousands of deaths and injuries from trauma could be eliminated with rapid, quality care.[25] The failure of previous legislation and federal policy was also highlighted to argue for this act. Data were presented showing that, despite years of work, only 7% of EMS vehicles met design standards, and 35% of EMS staff had minimally acceptable training.[25] The failure to develop regional EMS councils, quality communication, and universal access to care was also highlighted. The US EMS system was compared unfavorably with Moscow's EMS system, which provided care within 7 minutes.[25]

A number of medical leaders testified as to the importance of this legislation. Among them were representatives from the American Medical Association, American Heart Association, and the American College of Surgeons. Peter Safar, a founder of critical care medicine and EMS, described the state of EMS as a

". . . disgrace, primarily because of lack of organization, coordination, and clearly defined responsibilities and authorities . . . ," and that "Implementation of national recommendations concerning ambulance services' improvements are still being retarded because of incompetence, bigotry, indifference of the public and governments, and because the interest of providers rather than consumers prevail."[25] He criticized the government for failing to use the enforcement powers in the Highway Safety Act. He further emphasized the need to develop a community-wide system that provides acute care and includes research and evaluation. James D. Mills, President of the American College of Emergency Physicians, and John McDade testified as to the poor state of emergency care, the challenges of working with local governments to recognize the need for quality EMS services, and the need for funding to develop a proper system.[25] George Pickett, a member of the Executive Board of the American Public Health Association, testified as to the critical need for this legislation. In particular, he discussed the need for comprehensive health services delivery systems and emergency services, and he stated that the American Public Health Association had developed the section of Injury Control and Emergency Health Services to "bring together the interdisciplinary team necessarily involved in the effective delivery of emergency health services."[40]

Concurrent national events highlighted the need for improved EMS and had a major impact on the discussions. The night before the hearings began, Senator Stennis was shot and almost died. The week before the hearings started, President Johnson died despite cardiopulmonary resuscitation. Additionally, the shootings of Governor Wallace, Robert Kennedy, and Martin Luther King, Jr, and the cardiac arrest of Pennsylvania Governor David Lawrence, were remembered. These incidents and others were critically analyzed during the hearings, and testimony from physicians highlighted the "substandard" EMS provided to these individuals.[25]

The Nixon administration alone fought the bill, with representatives testifying that no additional legislation was necessary. They argued that current programs sufficiently provided care, that further demonstration projects were necessary, and that the EMS Systems Development Act was an unnecessary categorical program. Thus, Nixon vetoed the legislation.[49] Congress attempted to override the veto, but the override motion failed in the House by 5 votes (273 to 144). Congressional leaders felt that the override would have succeeded had a controversial clause directing the administration to continue the operation of the Public Health Service Hospitals been excluded. As a result, a second bill was immediately reintroduced, without the clause unrelated to EMS, and passed.[49] Nixon signed the bill.

The EMS Services Development Act of 1973 designated the Department of Health, Education, and Welfare as the lead EMS agency within the federal government. It authorized grants to develop a comprehensive EMS system throughout the country, for feasibility studies and planning, for the establishment and initial operation of EMS systems, and for the expansion and improvement of current systems. This act specifically identified 15 components needing development, including manpower, training, communications, education, and data collection.

The general themes present during the 1960s and 1970s, and present throughout the development of EMS, were reflected in this legislation. First, grants were used as the primary mechanism through which to create EMS systems, thus avoiding categorical government programs that would commit the government to continuing long-term support. Second, interconnected regional systems were promoted through the legislation, as they had been in the RMPs and the Robert Wood Johnson Foundation–supported programs. Helicopter transport and coverage of large regions, needed in this type of a system, were particularly emphasized. Finally, a technologically advanced and intensive system was promoted. Delivery of advanced medical care, such as defibrillation by trained health care workers, was central to the role of EMS in this legislation.

"The EMS Services Development Act of 1973 designated the Department of Health, Education, and Welfare as the lead EMS agency within the federal government."

IMPACT ON THE CURRENT US EMS SYSTEM

These historical and medical forces have resulted in the unique characteristics of the EMS system

"The important role of EMS providers in public health (beyond acute medical care) has been emphasized through a number of programs, conferences, and policy statements between the National Association for EMS Physicians, the American Public Health Association, the National Highway Traffic Safety Administration, and the Health Resources and Services Administration."

present in the United States today. Changes have occurred in the EMS system since 1973. New technologies and medications have continued to increase the level of care provided by emergency medical technicians. The federal role has been reduced significantly, to a role now primarily of technical assistance and coordination by the National Highway Traffic Safety Administration.[50] The Omnibus Budget Reconciliation Act of 1981 restructured the funding for EMS and integrated EMS programs into the Health Prevention Block Grants. This has further decentralized EMS activities and direction to each state, and has resulted in a decrease in governmental funding to EMS.[32,51] However, the fundamental themes evident during the early development of the EMS system (through 1973) continue to have a significant impact on the structure and functioning of the current EMS system.

Reducing the tremendous burden of heart disease, stroke, and trauma was a major force in the development of the EMS system. Political and medical leaders felt that, by deploying a sophisticated EMS system throughout the nation, death and disability caused by these conditions could be decreased. Without the stimulus of these common conditions to promote the need for EMS, the systems might not have developed as rapidly as they did. However, the emphasis on trauma and cardiovascular diseases has resulted in a sophisticated prehospital cardiac and trauma care system, while ignoring other significant patient populations, such as the pediatric population. Rectifying this imbalance has required additional public and private efforts, including legislation and funding to encourage research and training advancements.

Additional EMS emphasis on pediatric patients has occurred through the Emergency Medical Services for Children program, established through legislation in 1984 and supported by the US Department of Health and Human Services' Health Resources and Services Administration and the National Highway Traffic Safety Administration.[52,53] This program has trained many EMS providers how to care for children, provided services to prevent pediatric injuries, and supported pediatric EMS research. Emphasis on geriatric patients, such as that through a recent educational initiative by the American Geriatrics Society and the National Council of State EMS Training Coordinators, aims to improve the ability of EMS staff to care for older adults.[54] The important role of EMS providers in public health (beyond acute medical care) has been emphasized through a number of programs, conferences, and policy statements between the National Association for EMS Physicians, the American Public Health Association, the National Highway Traffic Safety Administration, and the Health Resources and Services Administration. One initiative was the "EMS Agenda for the Future," which presented the challenges and opportunities for the EMS system to achieve its public health potential.[55] A second was the EMS and Public Health Roundtable, which included public health and EMS leaders, such as Mohammad Akhter, MD, MPH, Quentin Young, MD, Arthur Yancey, MD, Theodore Delbridge, MD, and Robert Bass, MD. This group identified opportunities to deliver community health services through collaboration between EMS and public health professionals, and developed strategies to promote this collaboration.[55–57] These initiatives aim to integrate EMS into the public health infrastructure.

The focus on traumatic injuries and cardiovascular diseases has also shaped EMS standards, resulting in a set of standards needed for only a fraction of EMS patients. For example, one commonly accepted EMS standard is the 8-minute response time (EMS personnel must arrive at a patient within 8 minutes of the time of the call 90% of the time), which arose from the importance of providing early defibrillation.[58–60] To achieve this demanding standard, ambulances travel using lights and sirens, and large numbers of ambulances are positioned throughout each EMS region.

This rapidity of care is unneeded for most patients. Only those patients suffering out-of-hospital cardiac arrest have been shown to benefit from such rapid response (in order to defibrillate the patient).[61] There is great cost to this standard of care. A large number of paramedics are required to operate the EMS system to maintain the extremely low

response times. The paramedics and the equipment they use require a great investment in capital and significant operating expenses. In addition, the use of emergency lights and sirens to attempt to achieve this standard places the community and paramedics at greater risk for motor vehicle crashes.[62,63] The EMS system is beginning to acknowledge that the majority of patients do not require such rapid care. Research showing that longer response times are generally sufficient is being published, and policies are slowly changing.[64,65] However, because the system developed with a focus on cardiovascular diseases and traumatic injuries, which require rapid responses, researchers and administrators have to demonstrate that currently established standards do not apply to the entire EMS system and may be dangerous to the community.

The use of competitive grant funding, rather than categorical federal funding, for EMS program development has had a major impact on the structure and functioning of EMS in the United States. This funding process has resulted in a decentralized EMS system, with variation between EMS regions. Variations exist in all aspects of EMS, including standards, ambulance staffing, availability of medications, financial support, and organizational structure. As a result, "best practices" are not necessarily rapidly evaluated and implemented. Instead, each EMS region must identify the research results, evaluate the value of the results, and then attempt to apply the results with varying success. For example, research shows that the use of emergency lights and sirens has minimal benefit.[66] However, many systems still use the emergency lights and sirens for all types of patients. The decentralized system, which exists throughout medicine, is inefficient and does not ensure that all communities receive the best and most cost-effective care possible.

The decentralized EMS system that resulted from this funding mechanism has also limited the availability of EMS data. From the very beginning, the lack of EMS data was identified as a limitation of the system, and was expressly noted in the EMS Systems Development Act of 1973. However, with the multiple regions funded independently through grants, no organized, national data collection has occurred. This has seriously limited the ability of public health planners and EMS researchers to understand the characteristics of EMS patients, identify community EMS needs, and identify best practices present in EMS. This lack of data also has significant implications for current public health challenges. National disease surveillance, an important component of public health efforts to monitor for bioterrorism, epidemics, or clusters of injuries, is nearly impossible to accomplish because of the lack of coherent national data collection. Furthermore, decentralization has affected the nation's ability to prepare for terrorism because there is no single national office that can coordinate a national EMS response.

The emphasis on technologically advanced and intensive interventions available over large regions has resulted in a health care delivery system that can provide care to patients anywhere within a region, and then safely transport the patients to regional specialty centers rather than transporting patients to the nearest hospital, regardless of hospital abilities. The use of helicopters and planes has extended these regions to include larger regions than had been previously imagined, particularly to rural regions that lack the resources of urban areas. This characteristic of the EMS system has improved care for patients, particularly for cardiac, trauma, and burn patients, and has resulted in the regionalization of health care for which DeBakey and other proponents of the RMPs had hoped.

Unfortunately, the emphasis on technologically intensive interventions has resulted in a narrow EMS focus on acute disease and injury interventions, rather than a broader public health focus. EMS has the unique characteristic of caring for patients in their homes at unscheduled times. As a result, EMS providers can provide public health interventions, such as screening for diseases and injuries and evaluating home environments, notifying physicians and public health officials of identified deficiencies, and educating patients and family members on disease prevention during emergency responses. However, by concentrating on acute emergency interventions, such as defibrillation, intubation, and administration of medications, these possibilities have been ignored. This narrow focus has recently begun to change with support from the American Public Health Association, the National Association of EMS Physicians, and the National Highway Traffic Safety Administration.[57] New programs are beginning to be developed, implemented, and tested by federal agencies, private organizations, and university-based researchers.[53,67–71]

The impact of these themes has been quite significant in the United States, shaping the EMS system into its current form. However, these forces also are

having an impact in other nations, as their leaders look to the United States EMS system as a model system.[72–75] As the EMS systems evolve, knowledge of these forces and the impact they have had will be critical for health care leaders as they attempt to create a high-quality, cost-effective system that improves the overall public health.

CONCLUSIONS

The EMS system developed rapidly between 1960 and 1973 because of the convergence of historical, medical, and social forces. Although generally beneficial, these forces have resulted in an EMS system with notable limitations. EMS leaders must acknowledge these forces and limitaions as they continue to develop the system into one that provides uniformly high quality acute care to all patients, improves the overall public health through injury control and disease prevention programs, participates as a full partner in national disease surveillance, and is prepared to address evolving community needs such as terrorism preparedness, which has received so much attention since 2001.[76] ■

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